

**WHAT IS CLAIMED IS:**

1. A ball valve, comprising:
  - a valve body defining an inner cavity and having a fluid inlet and fluid outlet;
  - a control ball element rotatably mounted in the inner cavity, and having a segment defining a ball face;
  - a flexible annular valve seat positioned in the valve body, the seat comprising a base portion, a cantilevered portion having a sealing face disposed toward the ball face, and a connecting portion between the base portion and the cantilevered portion that is lesser in width than are the base portion and the cantilevered portion.
2. The ball valve of claim 1, further comprising a retaining ring that presses against the base portion to hold the valve seat in place and limit the motion of the valve seat toward the ball face.
3. The ball valve of claim 2, wherein the retaining ring defines an inner diameter that is smaller than an inner diameter defined by the valve seat.
4. The ball valve of claim 1, wherein the valve seat defines a central longitudinal axis substantially co-axial with a central longitudinal axis of the fluid inlet and fluid outlet, and further wherein the connecting portion has greater flexibility along the longitudinal axis than does the cantilevered portion.
5. The ball valve of claim 1, further comprising a rigid support ring held between the base portion and the valve body.
6. The ball valve of claim 1, wherein the cantilevered portion has a substantially constant width moving away from the sealing face.
7. The ball valve of claim 1, wherein the cantilevered portion has a slightly increasing width moving away from the sealing face.

8. The ball valve of claim 7, wherein the sealing face is formed at an angle approximately the same as the angle of the ball face at the point where the sealing face contacts the ball face.
9. A flexible annular seat for a ball valve, comprising
  - a base portion;
  - a cantilevered portion with a sealing face configured to be disposed against a control ball element of a valve, and;
  - a connecting portion between the base portion and the cantilevered portion that is thinner than the base portion and the cantilevered portion.
10. The seat of claim 9, wherein the connecting portion has a concave front wall and a substantially flat back wall.
11. The seat of claim 10, wherein the concave front wall comprises a smooth arc.
12. The seat of claim 9, wherein the cantilevered portion has a substantially constant width moving away from the sealing face.
13. The seat of claim 9, wherein the cantilevered portion has a slightly increasing width moving away from the sealing face.
14. The seat of claim 13, wherein the sealing face is formed at an angle that approximates the angle of a ball face at a point where the sealing face contacts the ball face.
15. The seat of claim 9, wherein the base portion defines a substantially flat bottom edge, a substantially flat front edge, and a substantially flat rear edge.
16. The seat of claim 9, wherein the cantilevered portion comprises a substantially flat top edge.

17. The seat of claim 9, wherein the seat is formed from PTFE.